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## ***Cari Rezeki, Numpang, Siap: The Reclamation Process of Peat Swamp Forest in Riau***

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### **I Introduction**

Until the late nineteenth century, scientists had thought that peat could be found only in cold latitudes. The discovery of peat in the tropics, therefore, came as a surprise. Unlike temperate peat, which has grass vegetation, tropical peat bears huge forests, sometimes exceeding 50 m in height. Such forest has a distinct physiognomy and is called Peat Swamp Forest (PSF).

PSF is found not everywhere in the tropics, but almost exclusively in Insular Southeast Asia [Whitmore 1975]. And one of the centers of PSF distribution is in Riau, where it occupies an area of 4,500,000 ha, amounting to nearly half of the total area of Riau (9,460,000 ha). Riau is usually divided into two parts, Kepulauan (Islands) and Daratan (Inland); but when the ecological setting is taken into account, PSF constitutes a third component, which is the largest in extent.

This vast area of PSF in Riau was for a long time uninhabited, unexploited and unutilized. No trace of human activities was found there. Orang Suku Laut and Malays lived in the vicinity of the PSF, but they never lived inside the PSF nor utilized it. Schot traveled up the Kateman river in the late nineteenth century and counted 1,865 Malays, 91 Chinese and 29 families of Orang Laut along a stretch of about 50 km in length [Schot 1884]. Those were mainly engaged in sago cultivation and fishery at the riverside and seldom utilized the PSF.

The above situation has been changing. People from neighboring Malay villages and from Kalimantan and Sulawesi have been coming into PSF. These immigrants have been reclaiming PSF at an accelerating rate and converting it into coconut plantations. This phenomenon is closely related to the economic growth of the area, which in turn is influenced by the penetration of the world economy into the area. Here, the transformation of Riau is reported from an ecological standpoint through a description of the change in appearance of PSF and the behavioral patterns of the people who are responsible for it.

### **II Ecological Setting of PSF**

PSF has been the least favorable environment for human habitation, the extreme heat and humidity creating a miasma that has discouraged people from settling. With Singapore's expansion and its

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demand for forest resources, *panglongs* (Chinese forest exploiters) were the first to step into the PSF. Reports on their life recorded their harsh living conditions, especially malnutrition and prevailing illness [Pastor 1927].

PSF has also been the least attractive forest in terms of its products. Unlike the forests of the Spice Islands or the benzoin-producing Batak forests, for example, PSF has no goods or valuables to satisfy the desires of outsiders seeking to make money. Historically, it had nothing worth the risk of life.

Besides the lack of forest products, PSF was not attractive for conversion into arable land. The luxuriant growth of trees is certainly a great obstacle to reclamation, but it is the peat itself that makes agricultural land-use particularly difficult. The simple slash-and-burn method carried out in other forest types in the tropics is not applicable nor sufficient in the damp peat area.

For these reasons, PSF has remained largely untouched until recently, compared with other types of tropical forests.

### III Rolling in PSF : *Cari Rezeki*

Today, PSF is being widely, rapidly and unrestrictedly reclaimed for new resources, mostly as farmland for commercial coconut cultivation.

Technically, the irrigation-drainage system called *pasang surut* makes reclamation of PSF feasible. Literally, *pasang surut* means “ebb and flow of tide,” and it has been translated as “tidal irrigation,” because of the uptake of fresh water through watergates and canals at high tide. In fact, the drainage of excess water is equally significant, particularly in thick peat areas, where reclamation for coconut cultivation has recently expanded remarkably. Canal-making is always a key or necessity for *pasang surut*, though the adaptive methods vary significantly depending on the location (Table 1). Canal-making, like clearance of primary forests, can be carried out by manual labor without employing special or complex techniques. To get land for coconuts in the forest, immigrants need only to dig a canal and cut trees. While physically this is hard work, the simplicity of the technique is particularly significant for immigrants who come without any financial, institutional and organizational support.

Use of *pasang surut* techniques alone, however, cannot account for the rapid expansion of reclaimed area. *Pasang surut* is a century-old “traditional” technique, not a new agricultural innovation. Originating in the PSF area in South Kalimantan, on the estuary of the Barito river, *pasang surut* was known in coastal Sumatra in the late nineteenth century. The first coconut-growing immigrants to Riau were said to be Banjarese, who came to the estuary of the Indragiri in the first years of this century.

The recent expansion of reclaimed area is mainly due to changes in economic conditions. Occupying a strategic position in the “Growth Triangle,” large-scale factories and estates have been founded in midst of the PSF area around Guntong (Fig. 1). Once peripheral, this area has become the center of cash-crop processing and export in the region.

The coconut oil factory is particularly important for the immigrant farmers. From the very

Table 1 Three Types of *Pasang Surut*

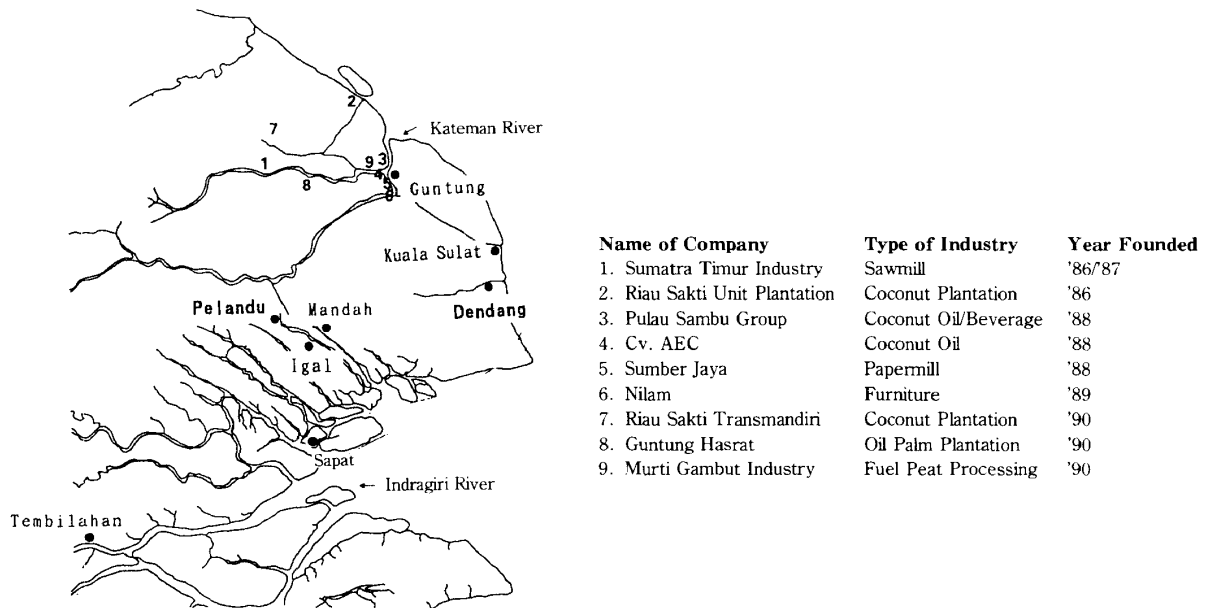
	Mangrove Type	Peripheral Peat Type	Central Peat Type
Location	Hinterland of mangrove Estuary of river	Peripheral PSF	Central PSF
Substance	Mangrove mud	Thin peat (1–2 m)	Thick peat (sometimes deeper than 5 m)
Water condition	Periodically flooded	Occasionally flooded	Seldom flooded
Vegetation & indication plant	<i>Sonneratia alba</i> <i>Nypa fruticans</i> <i>Derris elliptica</i> <i>Acrostichum aureum</i>	<i>Oncosperma filamentosum</i> <i>Alstonia angustiloba</i>	<i>Pandanus</i> sp. <i>Shorea leprosula</i> <i>Nephrolepis biserrata</i>
Crops cultivated	Coconut Paddy	Coconut (wide spacing) Paddy, Corn	Coconut (narrow spacing) Corn
Adaptive technology	<i>Parit</i> Watergate Embankment	<i>Parit</i> Watergate	<i>Parit</i>

Note: The estuary of a big river, where nutrient-rich soils are continuously supplied from upstream, is the most favorable location for growth of both rice and coconut. In fact, Sapat and the neighboring islands at the mouth of the Indragiri were the first places to have been reclaimed in the region, and these provided a foothold for further reclamation. Though suitable for crop growth, this location is susceptible to periodic flooding. To prevent flooding and influx of saline water at high tide, embankments and watergates are indispensable in this location. *Pasang surut* of the mangrove type is also practiced in the hinterland of mangrove, but never in “true” mangrove forest dominated by *Rhizophora* and *Bruguiera*, due to high salinity and the appearance of acid sulfate soils originating from mangrove muds.

Peat swamp forest is divided into two types, peripheral or nibong PSF and central or pandan PSF, depending on the depth of peat. Peripheral PSF areas also need watergates and secondary canals to plant food crops. On the other hand, central PSF areas usually need only a main canal, since tidal effects are less prominent. Thick peat is less suitable for coconuts and needs wider spacing of plants (6 *depa*) compared with thin peat (5 *depa*). *Depa* is unit of length represented by the span of the arms. (c. a. 1.7 m)

beginning, immigrants to PSF were cash-oriented farmers. Buginese, in particular, with their networks of information on money-making, reclaimed PSF for cash-export crops. They planted rice for their own consumption and coconut for sale to local brokers. The building of large-scale factories and easy access to them strengthened this tendency and promoted reclamation of PSF. Even forests on deep peat, less favorable for coconut plantation, are being reclaimed by increasing numbers of newcomers at an accelerating rate.

Immigrants are now connected directly to the world market. Seeking a livelihood, *cari rezeki*, they came to the PSF area. The area had long been sparsely populated, thus newcomers could use the resources at will without confrontation with any original inhabitants. They earned money from their newly opened land and made new livelihood. This new livelihood, however, was totally dependent on the coconut price. Having prospered from their coconut plantations, many chose to spend their money on making the pilgrimage to Mecca. In 1990, there were 388 pilgrims in Kabupaten Indragiri Hilir. The following year, the coconut price declined and only 52 people went



**Fig. 1** Location of Main Hamlets, Towns and Companies in the Study Area in Riau

Note : Dendang and Pelandu are hamlets where an intensive survey was carried out. The former is located in peripheral PSF and dominated by Bugis, while the latter is located in central PSF and dominated by Banjarese and Malay.

Large-scale industries and estates have been established around Guntung since 1986.

to Mecca. They are already firmly involved in the world economy and can never be free from it.

#### IV Life in PSF : *Numpang*

A canal is a lifeline in PSF. Reclamation of PSF begins with the digging of a canal. In the case of Pelandu hamlet (Fig. 2), four men, three Banjarese and one Javanese, worked cooperatively to make the main canal and cut trees about 14 years ago. Three Banjarese are relatives and, in a weekly market, they have come across with the Javanese who needed manual help for his plan to make a new canal. Then and there they decided to join together. They lived together in a temporary hut at the starting point of the canal. Food and other daily necessities were purchased in the nearest Malay fishing village, a one-day journey by *perahu* (boat). The work was done intermittently : it took two years to prepare land for the first food crops and a hut for each. Then they called for their families to join them. One of these pioneers became *kepala parit*, the head of canal.

“Land” is allotted equally among settlers. More precisely speaking, it is not land but a certain frontage along the canal that is allotted initially. Each family is allowed to clear their own land “without limit” in a direction perpendicular to the canal. Reclaimable forest may actually be limited when adjacent canals are located too closely to each other. But immigrants can extend their canal and reclaim new land along the extension. In this sense, the forest is inexhaustible. Under newly formed *adat*, immigrants lose the right to open the forest along a stretch of canal if they leave it uncut for 6 months.

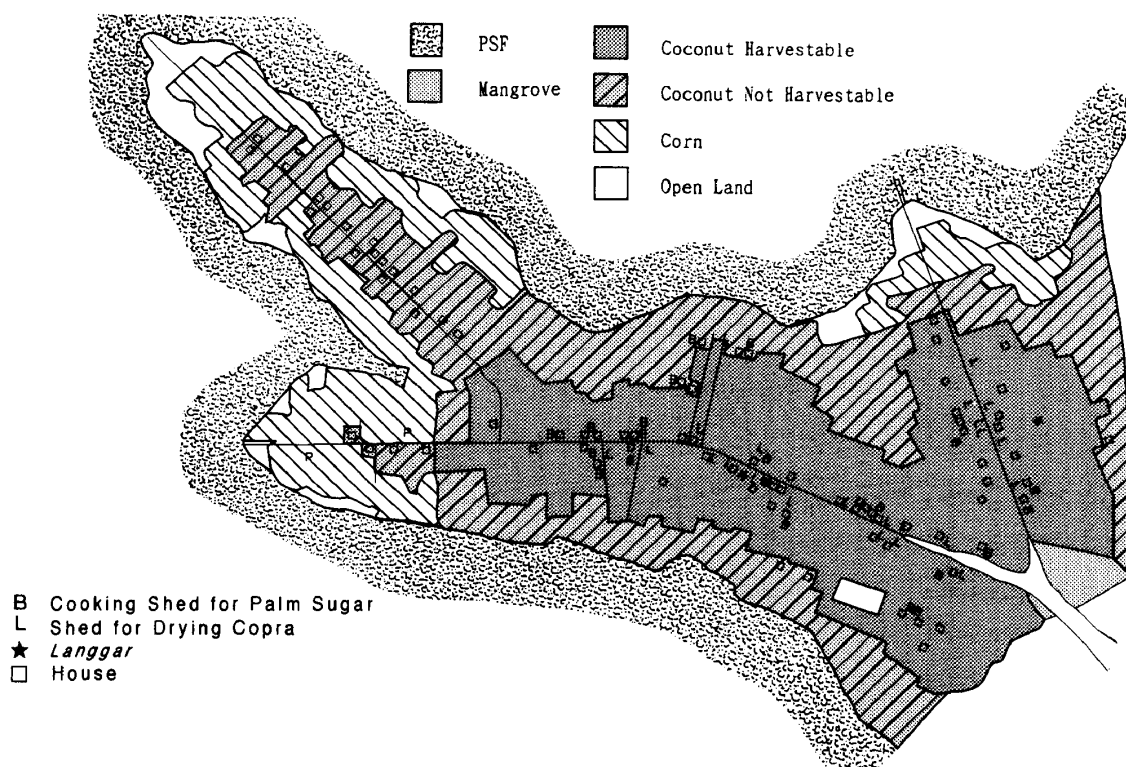


Fig. 2 Reclamation of Peat Swamp Forest in Pelandu

Two main canals (one with a branch) and several secondary canals are dug out. The central line is a canal and its junction with the river is the pivot for reclamation.

The extent of land acquired depends on the labor input by each family. Immigrants plant food crops and, among them, coconut seedlings close to the canal, while continuing to cut the forest into the interior. Here, a labor force is the only property of value. Land is valueless unless the forest has been cleared and coconuts have been planted.

Immigrants after a while progressively call their relatives or acquaintances from their home villages or former settlements to join them. As a result, immigrants along a canal are somewhat related to each other by kinship and/or birthplace. Then the canal is often dominated by one ethnic group. Although ethnic differences in lifestyle along a canal between Bugis, Banjarese, Malay and Javanese are not treated in this paper, basically, their land-use patterns are the same. Banjarese and Malay, however, tend to make brown palm sugar instead of copra to make money immediately. Extraction of juice from flower stems sacrifices further development of coconut fruits. Accordingly, Bugis and Javanese considers sugar production less profitable.

Immigrants need manpower to help them to make and maintain their coconut plantation. On arrival, a newcomer will stay, eat and work together (*numbang*) with his inviter. He receives his accommodation and food from the inviter and, in return, assists him in his fields. While helping his inviter, the newcomer reclaims PSF for his own coconuts. He is usually allotted the far end of the canal. In this way, the canal extends far into forest and becomes bustling along its length.

## V *Siap* : Future of PSF

Once a coconut plantation is established, there is little work to be done. Harvesting is done once or twice every three months, followed by processing to copra by smoking. Weeding is another necessary job, but it also takes only one or two days every three months. Thus, little time and labor are needed to maintain the coconut plantation. In an area crowded with immigrants, a mosque or praying house (*langgar*) are built in due time. A primary school is also established through the collaboration of inhabitants of several canals. Immigrants initially lived at regular intervals along the canal, but now tend to move and concentrate at the base of the canal, which is more convenient for transportation and schooling of children.

When the coconut trees begin to bear fruit, the valueless forests are finally transformed into wealthy plantations. At the beginning of reclamation, this frontier area looked wild and uncivilized (Photo 1), but gradually it has been settled. The coconut plantations are ready for harvest (*siap*) and promising (Photos 2 and 3).

For agricultural utilization of tropical peat, two characteristics of peat should be taken into consideration. One is its physical structure, the other its chemical or nutritional composition.

Tropical peat consists mainly of woody materials, trunks and branches of dead trees. These half-rotten trunks and branches constitute a scaffold structure, the gaps in which are filled with water



**Photo 1** Newly cleared PSF at the end of canal. Felled trees are still left unburned. Rice or corn is planted between these fallen trees.



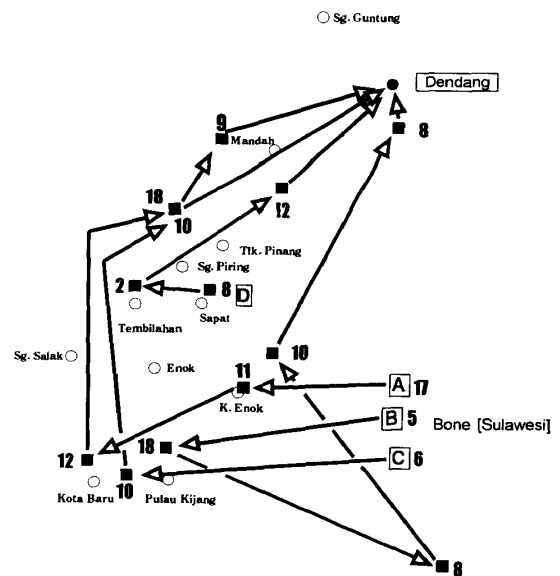
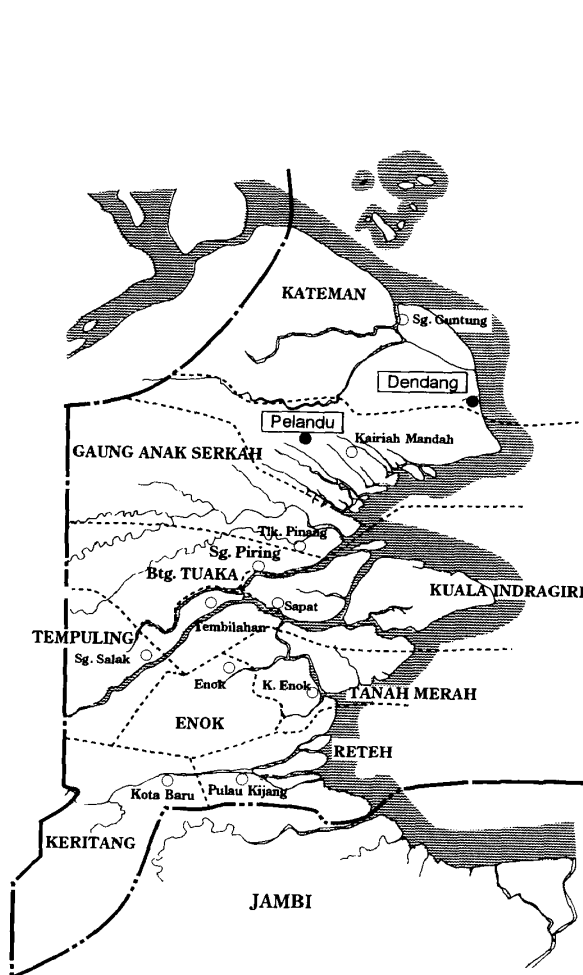
**Photo 2** Two years after reclamation. Corn has just been harvested. Coconut seedlings have been planted.



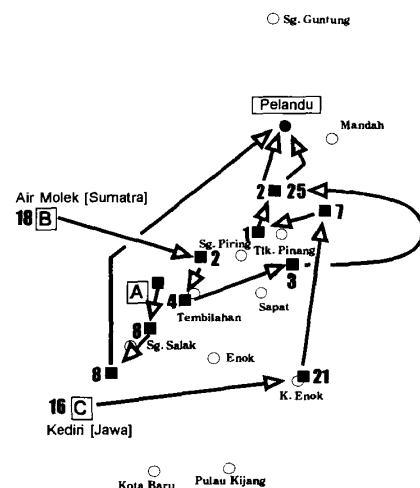
**Photo 3** Fourteen-year-old harvestable coconut plantation along the canal. The plantation seems to be prosperous, healthy, and going well so far.

and liquefied leaves. The structure of tropical peat is loose and open, not compact as in the case of temperate peat. After drainage of excess water, which is necessary in order to grow crops on peat, the woody materials decompose, resulting in compaction of the peat and depression of the peat surface. Consequently, it becomes vulnerable to flooding and salt-water intrusion. And coconut trees are easily uprooted when they have grown tall. "During the process of subsidence often permanent crops like coconut which through shrinkage lost the soil at their roots" and "the lifetime of such plantations is fifteen years at the most" [Polak 1975: 78-79]. Peat is not a stable substrate.

As for nutrient conditions, it is worth pointing out that the only material input comes from



**Fig. 3** Movement of Influential Members inside Riau: Case of Dendang



**Fig. 4** Movement of Influential Members inside Riau: Case of Pelandu



**Table 2** Reasons for Leaving Former Coconut Plantations :  
The Case of Dendang

No.	Age	E. Group <sup>1)</sup>	Reasons for Last Movement
1	45	Bu	Decrease of yield
2	32	J + B	*
3	35	Bu	No yield
4	50	Bu	No yield
5	57	Bu	Subsidence of peat
6	57	Bu	<i>Siap</i>
7	36	Bu	* <i>Numpang</i>
8	42	Bu	Decrease of yield
9	30	Bu	*
10	63	Bu	Decrease of yield
11	50	Bu	Decrease of yield
12	51	Bu	Decrease of yield
13	41	Bu	* <i>Numpang</i>
14	44	Bu	*
15	29	B	*
16	67	Mi	*
17	44	B	* <i>Numpang</i>
18	30	Bu	*
19	53	Bu	* <i>Numpang</i>
20	32	Bu	*
21	44	Bu	(move out)
22	79	Bu	Subsidence of peat, flooding and decrease of yield
23	34	Bu	Decrease of yield
24	30	Bu	<i>Siap</i>
25	47	Bu	* <i>Numpang</i>
26	42	Bu	<i>Siap</i>
27	26	Bu	*
28	47	Bu	No yield
29	35	Bu	<i>Siap</i>
30	48	Bu	Trouble with human relations
31	54	Bu	Trouble with human relations
32	52	Bu	Decrease of yield
33	51	Bu	<i>Siap</i>
34	40	Bu	<i>Siap</i>
35	45	Bu	<i>Siap</i>
36	44	Bu	Subsidence of peat and flooding
37	26	Bu	* <i>Numpang</i>
38	49	Bu	<i>Siap</i>

1) Ethnic Group

M: Malay, B: Banjar, J: Jawa, Bu: Bugis, Mi: Minangkabau

\* : The first trial for a coconut plantation

\* *Numpang*: Temporarily working on other person's coconut plantation.

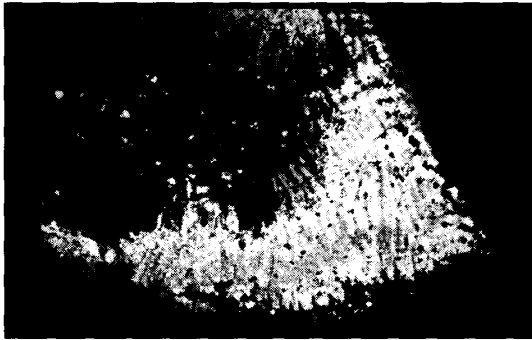
This is the first trial on his own.

*Siap*: The former coconut plantation is ready for harvest. Surplus labours are directed to new one.

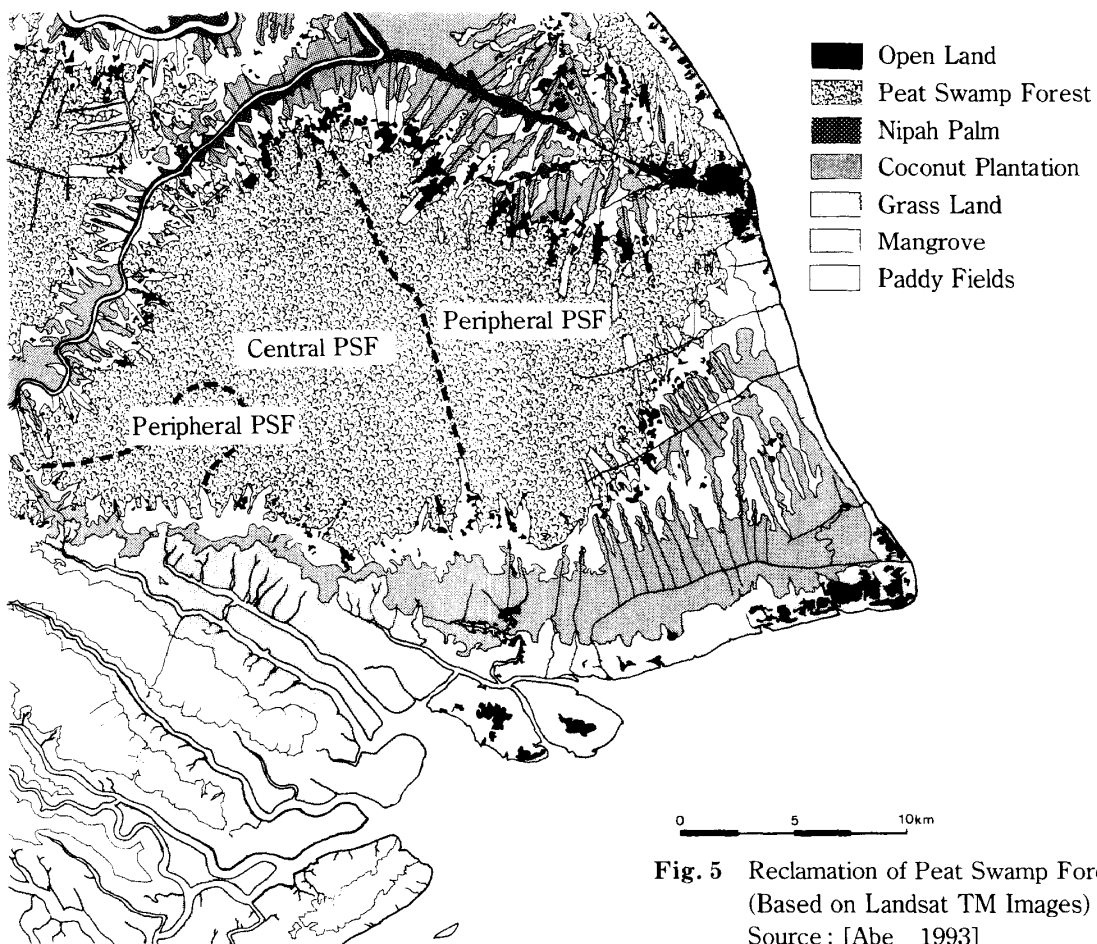
**Table 3** Reasons for Leaving Former Coconut Plantations:  
The Case of Pelando

No.	Age	E. Group	Reasons for Last Movement
1	42	M	<i>Siap</i>
2	19	M	* <i>Numbang</i>
3	52	M	Trouble with human relations
4	52	M	Trouble with human relations
5	27	M	* (Son of No. 4)
6	60	B	Subsidence of peat and flooding
7	37	B	* (Son of No. 6)
8	59	B	*
9	43	M	<i>Siap</i>
10	62	B	*
11	50	B	*
12	26	B	* (Son of No. 11)
13	28	B	* (Son of No. 11)
14	28	B	* <i>Numbang</i>
15	30	M	*
16	51	J	* <i>Numbang</i>
17	32	M	*
18	54	M	Decrease of yield
19	37	M	<i>Siap</i>
20	36	J	*
21	33	B	*
22	65	B	Subsidence of peat
23	32	B	*
24	54	B	Flooding and decrease of yield
25	39	B	*
26	35	B	*
27	28	J	*
28	36	B	Flooding
29	59	B	Subsidence of peat and flooding
30	30	J	*
31	38	J	*
32	60	J	*
33	33	B	*
34	39	J	<i>Siap</i>
35	27	J	*
36	69	J	<i>Siap</i>
37	53	J	*
38	46	J	*
39	62	B	*
40	45	B	Trouble with human relations
41	57	B	Subsidence of peat
42	45	B	*
43	34	M	*
44	48	M	*
45	54	B	* <i>Numbang</i>
46	36	B	*
47	29	B	*
48	23	J	*
49	42	B	*
50	51	B	<i>Siap</i>
51	44	J	*
52	26	B	*
53	35	B	*

Note: For ethnic groups and reference marks, see table 2.



**Photo 4** Landsat Images of the Study Area. Reclamation is encroaching deep into the PSF. Detailed analysis is shown in Fig. 5.



**Fig. 5** Reclamation of Peat Swamp Forest in 1989 (Based on Landsat TM Images)  
Source : [Abe 1993]

nutrient-poor rain in the PSF ecosystem. Tropical peat is, thus, oligotrophic, lacking mineral nutrients, particularly potassium and phosphorus of the major elements and copper of the minor elements. After a certain period of cultivation, crop yields drop suddenly, when the original nutrients in peat are exhausted. Nutrient deficiency is remarkable in deep peat areas. Ochis *et al.* [1993] reported the occurrence of copper deficiency in young hybrid coconuts planted in Riau. Symptoms appeared as early as 6 to 12 months after planting.

Thus reclamation of PSF is potentially dangerous and not sustainable. The land may subside

causing salt-water intrusion or uprooting of mature coconut trees, and it may lose fertility suddenly causing decline of yields or even death of trees.

Immigrants are obliged to abandon their coconut plantations sooner or later. Actually they are always moving in the PSF area and are never able to settle in one place. Interviews with immigrants clearly show how they are wandering in the PSF (Figs. 3 and 4). The movements of four pioneer canal openers (A = *kepala parit*, B, C, and D) to Dendang are traced in Fig. 3. The numbers indicate how many years they have stayed at the site. All are Bugis, but one (D) was born in Riau. As for Pelandu (Fig. 4), A is a Banjarese present *kepala parit*, B a Malay, and C a Javanese former *kepala parit*. B is not a pioneer opener but became an influential member of the canal residents with many followers.

Tables 2 and 3 sum up reasons why they left former sites in two study sites. Not all the immigrants were forced to abandon their former plantations. Once they have established (*siap*) a plantation at one site, they also speculatively move to a new forest site and clear it, looking for new *rezeki*. So far there is still a considerably large area of untouched forest to accept these wandering immigrants. Whether positively or negatively, they may continue to move around until the last forest is reclaimed, leaving a wasteland behind. Photo 4 and Fig. 5 show the results of encroachment into the PSF.

PSF, which had hitherto been no-man's-land, has turned out to be a "new area" crowded with people of diverse ethnicities and different cultural backgrounds. Reclamation of the forest is the only means they have of making their own living. They are undoubtedly the first inhabitants of PSF. No one else can be responsible for the future of PSF. Nevertheless, they never stick to nor take care of their lands as ordinary farmers do. For them, PSF remains land to be exploited.

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